Executive Summary

Background

The goal of the San Diego Regional Energy Infrastructure Study ("Study") is to develop a fact-based foundation for assessing San Diego region's electricity and natural gas needs through 2030. This is accomplished by identifying alternative resource development approaches to achieving the region's energy vision and limiting the future risks that exist. The vision consists of ensuring long-term energy security, controlling cost and reliability, minimizing risk, and minimizing the impacts of energy production and use on the environment, which will contribute to a higher degree of sustainability and a higher quality of life. The Study provides an integrated and comprehensive inventory and evaluation of current and potential future energy supply and infrastructure required to meet the growing needs of the region through 2030. Key infrastructure and resource options include:

- Electric generation, transmission, and distribution
- Natural gas supply, transmission, and distribution
- Energy efficiency and demand response programs
- Distributed generation and renewable resources.

The Study was directed by the San Diego Regional Energy Office (SDREO), conducted by Science Applications International Corporation (SAIC), with funding and active participation of the City of San Diego, and the County of San Diego, the Port of San Diego, the San Diego Association of Governments (SANDAG), the San Diego County Water Authority, and the Utility Consumers Action Network (UCAN).

Key Infrastructure Issues Facing San Diego County

- **Continued increases in natural gas and electricity prices—energy cost stabilization**
- **Fragmented energy infrastructure planning in the region**
- **Tremendous uncertainty regarding energy supply and demand**
- **Highly uncertain market design**
- **Creating a flexible electric and natural gas resource portfolio**
- **Developing indigenous generation, such as the Otay Mesa Power Plant and repowering local plants to achieve a minimum in-County generation self sufficiency**
- **Evaluating alternative transmission options to improve reliability and price stabilization**
- **The cost to create cleaner energy sources**
- **Expanding the role of energy efficiency, demand response, renewables and distributed generation**
- **Limiting the risks of heavy reliance on natural gas**

The objective of this Study is to provide the public and decision-makers with the necessary information to evaluate options and make choices for meeting future energy supply and demand of the region. These choices are difficult when the region cannot control the many decisions that are being made at the state and federal level, especially the degree to which a new, modified energy market will evolve.

The region has the opportunity to be more active in influencing forthcoming key decisions at state and federal levels regarding regional energy matters. Critical issues are facing the region in terms of developing a balanced portfolio of energy resources that recognizes the volatility of electricity and natural gas prices, the uncertainty surrounding the cost and availability of certain renewable technologies, the timing and availability of new transmission, addressing reliability issues, and evaluating important new generation assets or the repowering of these assets in the region. The goal should be to create hedges and options in the region by diversification of generation, transmission, demand response and energy efficiency resources. A strong commitment to cost-effective energy efficiency and renewable resource options is also needed.

There is also an important need to recognize the broader synergies with the Western power and natural gas markets, including Northern Baja California and neighboring counties. These areas face similar problems and working together to craft solutions can provide significant benefits.

The Problem

San Diego County is one of the top three residential electricity cost markets and in the top six commercial cost markets in the United States. The region also faces very high natural gas

transmission and city gate prices—often higher than other regions. Many factors drive these costs: regulation, market power, geography (i.e., terrain and land density), infrastructure performance, and other factors.

The region simply cannot afford the "business-as-usual," ad-hoc approach to market and infrastructure planning. The high costs to consumers will continue to strain the economic vitality of the region. The region also cannot count on state and federal regulators to make decisions that are in the best interests of the region. Simply put, the region must become more engaged and involved in planning the region's energy infrastructure.

The main focus of this report is to identify options that limit natural gas and electricity costs and market risk. A way to do this is to develop a comprehensive resource portfolio that takes into account price or market risk and flexibility. Active participation of the community and key stakeholders in defining, evaluating and selecting regional infrastructure projects for development is needed.

Key Findings

- **Electricity demand is estimated to nearly double by 2030**
- **It is becoming more difficult to meet this growing demand with traditional grid-based generation and transmission infrastructure**
- **Energy efficiency and DG-renewables can be the difference between deficits and adequate supply to meet growth. Between 8 and 23 percent of new load growth can be met with energy efficiency and DG-renewables.**
- **A minimum of two 500-MW base generating plants are needed—more if the region does not pursue alternative energy sources**
- **Additional transmission is needed**
- **Sufficient local natural gas distribution system capacity exists for core customers**
- **Market power issues continue to exist and could worsen for natural gas capacity and supply**

Project sponsors realize that the region cannot afford to be reactive in ensuring a sufficient supply of energy to meet the growing energy demand. New generation and transmission siting must consider other options and perspectives beyond the narrow and sometimes piecemeal considerations that are raised. A more comprehensive and inclusive public dialogue and involvement are needed in selecting major new regional energy infrastructure projects. In addition, the region has valuable assets of its own that could be drawn upon to help control risks and contribute to the County's resource portfolio. These resources come from the San Diego County Water Authority, the Port of San Diego, the City of San Diego and County of San Diego, to name a few. Also, the many commercial and industrial customers who have existing supply resources can be drawn upon to contribute to the resource portfolio.

As a reaction to the recent market failure in California and the current industry restructuring, consumers are demanding that a greater range of options be considered, including non-traditional alternatives, particularly renewables. Consumers are also becoming more skeptical about market performance, government oversight and policymaking efficacy. Greater involvement and self-determination at the local level is viewed as a key to improving the quality and value of the energy infrastructure of the region.

The Key Questions

The key questions that this report addresses are:

- What is the expected supply/demand balance in the region through 2030?
- How adequate is currently planned generation and transmission capacity to meet these anticipated demands?
- What mix of resources is possible to cost-effectively meet demand requirements?
- What new transmission capacity is needed and when?
- To what degree are demand-side programs effective and what can be done to increase the public investment in demand-side strategies?
- Given the increasing dependence on natural gas, what renewable resource options are reasonable to pursue?

- What types of risks will the region face in the years ahead and how can it minimize its exposure to these risks?
- What organizational response is needed in the community from a public policy perspective to be more effective in ensuring its future energy security?

Current vs. Future State

In the past, the energy industry's large generation and transmission infrastructure was funded and developed on a cost-basis using a fixed rate-of-return on the capital base. It was planned, constructed and maintained by SDG&E with oversight by the state Public Utilities Commission. However, the state industry restructuring effort in 1996 made fundamental changes in how this was accomplished. SDG&E has indicated it no longer deems its role to be the regional energy planner, and the Public Utilities Commission's regulatory scope has been curtailed in lieu of market-based pricing. In light of the many uncertainties surrounding the future of energy markets and regulation, a new energy supply paradigm is required, one that achieves a more balanced portfolio of supply and demand resources including distributed energy options.

This study explores that new paradigm—one that balances demand-side efficiency, distributed generation and renewable resources that are much more attractive options as energy costs have soared. The level of cost-effective investment in these options can continue to increase as more innovative procurement and financing options are pursued. Under the state's new renewable portfolio standard, a growing amount of renewable resources will be required. This will be an opportunity for the San Diego region to increase the utilization of its indigenous renewable resources to create a form of "energy self-reliance" not seen before. The region has a tremendous opportunity to define its energy destiny that is harmonious, and not harmful, to the local economy, environment and consumer. The region can also decide to engage in a more participative, comprehensive planning process that is more flexible and will more readily adjust to changing external conditions, rather than relying only on large, capital-intensive solutions that have a significant lag time.

This study also assumes a competitive wholesale power market paradigm for wholesale supply, even though CDWR wholesale power is still above market prices. At the end of the contract period, prices should track wholesale market prices. The end result is an underestimation of wholesale prices and the consumer benefits of energy efficiency and demand response.

Summary of Major Findings

The major findings of the this study are as follows:

- Over the long-term, scenarios projecting low, medium and high natural gas and electric growth rates were defined. Electricity peak demand will nearly double, increasing by more than 4,000-MW by 2030. (Chapters 4, 6 and Appendix D)
- The region needs to develop a portfolio approach to balancing energy supply and demand options. Yet, there is no real institutional mechanism that exists to effectively accomplish this. (Chapters 4, 5, and 6)
  - The region needs to consider developing a balance of in-basin new generation and repowering of selected existing plants to meet future load growth requirements
  - The region needs additional transmission interconnection to the South (immediately), North (4-5 years), and East (in the 2020 time period and beyond)
  - The region can meet a significant proportion of its load growth through energy efficiency, demand response, distributed generation and renewable resources.
  - The region should recognize that renewables and some distributed resources are subject to technical and market risks that need to be taken into account.
  - The Otay Mesa plant is a strategic asset and the region should take the necessary action to ensure that this plant is built—and that maximum use of the asset in terms of total development potential is considered.

  - Existing power plants located in the South Bay and Carlsbad (Cabrillo) must be repowered as quickly as is feasible to maximize natural gas efficiency and supply potential.

- The region should consider the development of a joint energy development authority to ensure that a certain proportion of public and private energy assets are used to meet future energy requirements. These assets can also serve as a hedge against market volatility and dynamics that can lead to similar price shocks that were recently experienced in California and San Diego, in particular. Significant risks exist regarding the heavy dependency on natural gas for power and major direct uses. To some extent natural gas prices and future natural gas availability will drive the energy economy in the 2010–2030 time period. The region must actively consider these risks and attempt to develop the necessary hedges and options to control this risk. (Chapters 3 and 7)[1]
- In the short term, natural gas supply is more than adequate to meet current and near-term core customer demand. (Chapter 3)
  - Longer-term, demand is expected to grow significantly as new natural gas-fueled power plants come online. Questions exist about how best to price EG natural gas.
  - The region needs to consider ways to increase competition and encourage cost reduction in California natural gas prices and also improve the management of within state natural gas transmission costs.
  - Growth in demand for natural gas will continue to accelerate as more power plants are built. The retirement of large existing plants in 10 to 20 years will further accelerate this growth. Gas production to supply these plants is expected to peak and then decline within the next 10 to 15 years, placing additional upward pressure on prices. Other than increased growth of renewables and demand reduction, importation of Liquid Natural Gas (LNG) provides the only suitable alternative.
- To meet future electricity requirements, a balance of in region new generation development, transmission expansion and energy efficiency, DG and renewables are needed. The region should work toward creating a balanced energy portfolio. (Chapter 5)[2]
  - As many as three new 500-MW base power plants are required over the next 30 years, and new transmission will also be needed. Between now and 2010, at least two new generating plants are needed to replace the older plants that will be decommissioned.
  - Substantial renewable resources exist within the county and nearby. Over time, these resources can cost-effectively provide needed new energy supplies that will economically benefit the region.
  - Substantial economic value-added benefit exists from demand-side resource options including expanded efficiency and small-scale generation. The largest energy-saving measures include commercial lighting, commercial ventilation and air conditioning, time-of-use pricing and retrofit of existing buildings to current standards. A market-based demand response and conservation investment buy back program would encourage greater participation in these programs as would an emission offset credit program. This means a program that purchases conservation resources up to the short-run and/or long-run marginal costs of either the energy or emissions that are displaced.
  - Better incentives that encourage retrofit of existing buildings should be strongly considered, such as incentives for condition-of-sale provisions for residential property.
  - The region should recognize the valuable contribution that energy infrastructure resources in North Baja California provides and work toward achieving a satisfactory contribution to its

[1] This recommendation should be investigated and re-evaluated in light of the SDG&E new resource situation that includes the CDWR contracts and its own long-term supply situation.
[2] Since this section was written, CDWR contracts, through CPUC actions, have been allocated to SDG&E and other utilities. SDG&E feels that these contracts will meet the energy needs of the county over the next 10 years. Project sponsors need to investigate this position as it moves forward in developing a regional energy strategy. See Addendum to this report for more information on this issue.

portfolio from this source—for both generation and renewable resources. A bi-national development framework and program should be encouraged.

– Additional transmission is needed. Short-term priorities include more transmission to the south and north. Eventually, additional transmission capacity to the east is needed in the post-2010 period.

Economic Development Benefits

This study found significant economic development returns are available from improved resource selection—as much as a 5-to-1 investment return from energy efficiency and small-scale distributed generation. For investing as much as $3.6 billion, the community could realize an economic benefit of $17.8 billion. Thousands of jobs would also be created in the community over the 30-year period. The region's economy and energy services industry base is well positioned to take advantage of the growing demand for distributed generation and renewable resources.

Implications for the Regional Energy Strategy

A change is needed for future energy infrastructure planning in the region. This Study concludes that the region can become more self-reliant through better organization and utilization of county-wide talents and resources. The region needs to seriously consider creating a joint energy development authority that evaluates, recommends and co-invests in regional energy infrastructure projects. These projects could be either independently publicly supported or be joint ventures with private developers. The region needs to add more diversity to its resource base and work toward achieving a balanced resource portfolio. In addition, the broader implications of energy facility siting considering interrelationships of generation and transmission, achieving higher levels of system reliability and the benefits of avoiding both outages and excessive market prices are critical focus areas. Energy efficiency, demand response, renewables and distributed generation are critical "swing factor" resources that can have a tremendous impact in avoiding or delaying future capacity increases plus achieve market price stability.

Future Options for Consideration

- **Better organization of public resources, including evaluating creation of a joint power agreement or power development authority to pursue a more aggressive regional energy investment strategy**
- **Strong endorsement for cost effective-to-high efficiency distributed generation and renewable investments**
- **Closely track federal/state energy policy and regulations, particularly FERC and the development of national energy policy. State PUC and CAISO proposed rules, pricing and cost allocations also should be closely tracked, and united positions on these issues formed.**
- **Capacity bidding and energy conservation investment markets**
- **More active lobbying in state and national regulatory and infrastructure issues**
- **Pursuit and selective implementation of time-of-use pricing and metering**
- **Better incentives for existing building upgrades**
- **Access to more diverse interstate markets and fuels for power generation**